

Armor (S. G.)

*With kind regards of the
Author,*

CATARRHAL AND CROUPOUS INFLAMMATION
OF
MUCOUS MEMBRANES.

By SAMUEL G. ARMOR, M. D.,

PROFESSOR OF THE PRINCIPLES AND PRACTICE OF MEDICINE AND CLINICAL MEDICINE IN
THE LONG ISLAND COLLEGE HOSPITAL, BROOKLYN, N. Y.¹

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GERMAN and other Continental writers and teachers are giving unusual prominence to the study of morbid states of mucous membranes, and, with new and extended pathological views, are attaching to certain terms, long in use, a signification unwarranted by our current English literature. This is especially the case with FELIX VON NIEMEYER, author of the excellent "Text-Book of Practical Medicine." American and English practitioners, who have been educated in a different school, cannot read this work, for the first time, without being unpleasantly reminded of a change in the nomenclature of disease. Thus, the terms "catarrhal" and "croupous" inflammation of the lungs, "catarrhal" inflammation of the stomach, bowels, kidneys, bladder, and uterus, sound strangely to those whose nomenclature confines these morbid states to the *upper portion* of the respiratory mucous membrane.

If there is nothing gained in clearer and more truthful conceptions of definite morbid states by this greatly-extended application of these terms, they should be rejected, as tending to unnecessary confusion. Whether this be so or not,

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whether our author has been unhappy, or otherwise, in the selection of his terms to describe certain morbid states of mucous membranes wherever found, it is but justice to the fame of one of the most illustrious teachers of Europe that we should clearly comprehend what he means by these terms before we condemn his nomenclature as a mischievous innovation.

That he may not be misunderstood, he takes occasion to state, in the very first chapter of his book, that he does not limit the term "catarrh" to "that class of inflammations of the mucous membranes acquired by 'taking cold,' and to relieve which one wears flannel and drinks elder-blossom tea." And, that he does attach to the term certain definite and well-defined ideas, can be readily seen from his etiology of "*acute gastric catarrh*."

Among the exciting causes of this he enumerates: 1. Large quantities of food—more than the gastric juice can dissolve. 2. Food difficult of digestion—the products of its decomposition, when partly digested, giving rise to catarrh. 3. Substances which have begun to decompose before entering the stomach, such as spoiled meat, sour milk, etc. 4. Irritants, including hot articles of food, some medicines, alcohol, spices, etc. 5. Substances that weaken the digestive power of the gastric juice, or retard the movements of the stomach.

Now, it will be observed that all these exciting causes are such as give rise to very common forms of *indigestion* and *dyspepsia*. It is evident, however, that he means by "gastric catarrh" a condition similar to, if not identical with, that described by other authors as "*subacute or chronic inflammation of the stomach*." For, in a separate chapter on dyspepsia, he says he "shall only speak of those disturbances of digestion which arise without perceptible change of structure of the stomach."

The question at once presents itself, therefore, as to whether there is any thing gained in clear conception of certain morbid states by the use of the terms "catarrhal" and "croupous," over that of unqualified inflammation of mucous membranes. Evidently there is; for the reason that they point out a definite pathological condition peculiar to *mucous membranes alone*. "Catarrh consists in engorgement of the blood-vessels

of any mucous membrane, accompanied by abnormal secretion, swelling, succulence of its tissues, and copious generation of young cells."

In another connection Niemeyer more specifically defines catarrh as consisting in :

1. Hyperæmia.
2. Abundant flow of mucus.
3. Increased detachment of epithelium.

The lesions are here concisely stated; they describe a definite condition, and are easily understood; to them, in the associated order here presented, the simple term *catarrh* is applied: it is a condition affecting mucous membranes in every locality.

Hyperæmia, it will be remembered, may exist in two distinct forms—healthy and morbid. In the gastric mucous membrane, physiological hyperæmia takes place every time food is taken into the stomach; in other mucous membranes, with few exceptions, this same hyperæmia is morbid. It is only when the physiological process increases beyond *normal* limits in the stomach, or any other mucous membrane, that the condition exists which is described as catarrhal.

We shall, of course, fail to comprehend abnormal conditions of mucous membranes if we do not clearly comprehend the fact that mucus, as a *copious fluid secretion*, is a distinctly morbid condition of the tissue. The natural secretion of a mucous membrane is its epithelium, and every thing beyond this is, just so far, morbid.

The globules which are seen in mucus under the microscope are, according to Henle, substances which, in the normal state of typical perfection, would form epithelium. Their natural history, undisturbed, is a gradual approach to the free surface of the tissue, during which they are dried, compressed, and elongated into flattened, cylindrical, or stratified forms of pavement epithelium. Under the spur of excitement, in hyperæmic conditions of the membrane, these young cells are prematurely moulted off in every stage of development—born before their time—"infant tissues strangled in their birth."

In studying the subject, therefore, we start with the simple elementary forms of mucous corpuscles, and follow them

through their several stages of development; bearing in mind the fact that mucus, as a copious secretion, is one of the first results of hyperæmia. We recognize the mucous fluxion as a distinctly morbid condition which is often curative of the lesion which produces it. In temporary congestion of mucous membranes the mucous flow is often the only morbid manifestation ever present.

But, in more active and persistent excitement, pus becomes mingled with mucus, so that we have the characteristic mucopurulent discharge (mucous and pus corpuscles). Pus-cells, mucus-cells, and epithelial cells are, I believe, now regarded by histologists as equivalent elements, which, under certain circumstances, may replace one another. Physiologically, however, they are known to be distinct elements. What are the conditions, therefore, under which this replacement takes place? While awaiting the final decision of histologists on this question, we simply affirm that, as seen on the free surface of irritable and inflamed mucous membranes, mucus and pus exist only as products of morbid hyperæmia.

As to the origin of the pus-cell, as a morbid product, physiologists, at the present time, recognize at least two distinctly different modes of formation. In the *first*, the growth of the pus-cells proceeds from the germs of superficial tissue (*epithelium*); in the *second*, from *connective tissue*. To these may be added a *third*, according to the views of Waller, Cohnheim, and others, based upon the alleged discovery of stomata, or pores, in the walls of blood-vessels which admit the exit through them, in inflammation, of white "migratory" blood-cells (leucocytes), these undergoing further metamorphosis into ordinary pus-cells.

All these views, it will be seen, regarding pus formation, are based upon the essential fact that all new cells proceed from other cells, or from the nuclei of them. We may not be able, in all cases, to distinctly trace, through multiplied divisions and subdivisions of dividing nuclei, the origin of the pus-cells; we simply affirm their *cellular* origin, and their intimate relationship to mucus-cells, epithelial cells, and "migratory" white blood-cells found in inflamed blood-plasma. It is with the relations of these products of inflammation, however, to

mucous membranes that we are principally concerned at present.

In studying the subject, we start with the simple statement, already made, that epithelium is the natural secretion of a mucous membrane. Now, in certain morbid states of hyperæmia, this epithelial covering becomes less and less characteristic; the mucous corpuscles are hurried from the surface before they have time to undergo their normal changes of development; they drop off in every stage of abortion; mucus begins to assume the physical characters of pus; the true inflammatory process is established; so that we often have, on the free surface of the inflamed membrane, variously combined, all the gradations between epithelial cells, mucus-cells, pus-cells, granule-cells, and "inflammatory globules."

With these varied forms of cell-growth there exist great differences in the quality and tendencies of the fluid effused on the free surface of the membrane. Rokitansky describes the typical forms of the more organizable products by the terms *fibrinous* and *croupous*, and these terms are generally adhered to by German writers. Williams and other English writers apply to the same conditions the terms *plastic* and *aplastic*.

The character of the exudates depends, of course, upon the character of the cellular elements entering into their structure. The larger the proportion of corpuscles, for instance, the greater is the tendency to the formation of unorganizable pus rather than the more organizable forms of croupous exudates; whereas, in "adhesive inflammations," there is preponderance of blood-cells, "inflammatory corpuscles," and fibrillated material characteristic of plastic lymph, which may become "nidus substance taking some share in the growth of new elements, like the natural connective tissue of the body."

In true *croupous* inflammations, amorphous or finely-fibrillated plasma rapidly assumes, after exudation, the form of a low organization, but it involves, according to Niemeyer, the *epithelium only*, and its tendency is to assume, more and more, the character of pus. Hence, after a longer or shorter time, the croupous membrane may be readily removed, and leaves no loss of substance after removal.

In *diphtheritic* exudates, on the other hand, the newly-formed structure does not lie on the *surface*, but enters into the substance of the tissue. It is not, therefore, easily removed, and, when separated, it is in the form of a "diphtheritic slough," resulting in superficial gangrene of the mucous membrane, and the formation of a so-called diphtheritic eschar.

Rokitansky also describes an *albuminous* exudation, which appears to be identical with the lower varieties of the croupous form, and modified, in some degree, by occurring in depressed conditions of the system.

With these general elementary facts before us, I venture to suggest, by way of systematizing and generalizing our knowledge, a classification of acute morbid states of mucous membranes something like the following :

1. Catarrh.
2. Suppurative inflammation.
3. True croupous inflammation.
4. Diphtheritic inflammation.

The natural history of acute inflammations of mucous membranes is about in the order here presented, and the careful study of the special conditions giving rise to each type of inflammation cannot fail to dispel much of the fancied "mysticism" of the new German pathology.

By reference to the several conditions here named—passing from the simple to the more complex—we cannot well fail, for instance, to understand what Niemeyer means by the varieties of pneumonia he describes, namely, croupous, catarrhal, and interstitial pneumonia.

In *croupous* pneumonia (one of the most common diseases of adult life, according to Niemeyer) rapidly-coagulable exudation is thrown out upon the free surface of the air-vesicles, involving their epithelium; in the *catarrhal* variety, which is intimately related to capillary bronchitis, and, of course, somewhat peculiar to childhood, the process is, in some respects, similar to the croupous, but no *coagulable* exudation is formed; while in *chronic interstitial* pneumonia the inflammation involves the walls of the air-vesicles and the interlobular connective tissue.

According to the distinctions here made, it will be observed that, in the *croupous* and *catarrhal* varieties of pneumonia, the pulmonary tissues themselves suffer little or no nutritive disturbance; while in the interstitial variety it is the intercellular and interlobular connective tissue which is the seat of inflammation.

Catarrh of the intestinal mucous membrane differs in no essential particulars from the same state in the mucous membrane of the respiratory track, and here, as in every locality, it is the result of *hyperæmia*, whether produced from purely mechanical or local causes. As an intestinal lesion it constantly accompanies obstruction of the circulation of the liver, and all causes which give rise to *local irritation*. The acute form of the disease usually manifests itself by more or less diarrhœa. But the chronic form of the disease, when located in the small intestines, and occurring in adult life, is rarely accompanied by extensive serous transudation into the bowels; on the contrary, constipation usually prevails.

In some cases, distinctly croupous casts are found in the large intestines, as in the bronchial tubes; in others the inflammation has a diphtheritic character. This latter condition has been especially observed in epidemic dysentery. It is not unusual, in this form of the disease, to find the diphtheritic exudate deposited in the tissue of the membrane; so that, when it is sloughed off, there is superficial gangrene, followed by erosion and loss of substance in the mucous tissue. The same condition may lead to diffuse and follicular ulceration of the intestine; and, not unfrequently, it extends to the entire wall of the cæcum, giving rise to what is known as *typhlitis stercoralis*.

In sporadic and epidemic cholera, cholera infantum, and all forms of abdominal disease characterized by rapid transudation of the watery elements of the blood, the processes, already described and classified as "catarrhal," are all quickened; the cellular elements of blood-plasma are thrown too rapidly on to the free surfaces to form mucus, or pus, or even croupous and diphtheritic exudates: these require time—less, it is true, than to form normal tissue, but still they are the products of a comparatively slow process.

There is another intermediate form of intestinal catarrh, in which the condition of hyperæmia is followed by slowly-oozing elements of blood, which, mingling with lactic and other acids secreted by mucous membranes, give rise to the peculiar *green discharges of childhood*. The essential characteristics of these discharges are simply such as pertain to catarrhal and croupous exudates of mucous membranes in every locality; they will be found to contain altered blood-plasma, epithelium, mucus, and young blood-cells in every stage of degeneration.

I have already alluded to the fact, important in a diagnostic point of view, that chronic catarrh of the small intestines may exist without increased pro-fluvia from the mucous membrane. We can only infer its existence from a general class of symptoms, and these relate chiefly to functional disturbances of the *liver*. It is now well understood that acute or chronic gastro-duodenal catarrh is at the foundation of nearly all "biliary derangements." The acute variety is, of course, easily detected; but chronic duodenal catarrh is often overlooked. We infer its existence mainly from a general class of symptoms, such as impaired appetite, deranged secretions, slimy-coated tongue, bad taste, highly-colored urine, dingy complexion, fermentation and decomposition of the intestinal contents, flatulence, constipation, mental despondency, hypochondria, and a host of anomalous and unpleasant nervous disturbances. Catarrh of the gastro-intestinal mucous membrane cannot exist as a chronic affection without involving the mucous membrane of the ductus choledochus and its branches in the same morbid condition. These ducts being small, and destitute of contractile elements to urge their contents onward, the bile is easily obstructed by the swollen and hypertrophied membrane, and the tough, viscid secretion on its free surface.

There can be no doubt, therefore, that chronic gastro-intestinal catarrh sustains a direct causative relation to most of our so-called "bilious" diseases. Nor can there be any doubt, in my judgment, that most, if not all, of our popular "chologogues," so far as they act curatively, do so by their direct impression on this morbid condition of the duodenal mucous membrane and of the large bile-ducts of the liver. That this is

the therapeutic action of many of our popular sulphurous, alkaline, and laxative mineral waters—whose efficacy in the treatment of these affections has been well established—I have been long satisfied; and that they owe their reputation as universal remedies to the great frequency of gastro-duodenal catarrh is equally certain. “Even in catarrhal *jaundice*,” says Niemeyer, “the use of the Marienbad or Karlsbad waters is followed by the most favorable and speedy results.”

Catarrh of the uterine mucous membrane is of frequent occurrence, and the pathological nature of the difficulty has been a subject of most prolific discussion. I do not purpose, in this connection, to examine the various reasonings and speculations of eminent gynecologists on controverted points: I am only concerned at present with mucous membranes, and the general analogy of their morbid states.

That the uterine mucous membrane is subject to modifying circumstances in connection with periodical ovulation and menstruation, I can readily believe; and that there are intra-uterine physiological exudates at special times, which, in other localities and at other times, would be morbid, seems, theoretically at least, to be quite plausible. But, that morbid changes of the uterine mucous membrane, from the varied circumstances of irritation, congestion, inflammation, etc., do not essentially differ from those of other mucous membranes, similarly affected, cannot be doubted. The same law of inflammation, modified by tissue, holds good; we observe the same hyperæmia, swelling, cedema, and hypertrophy, the same muco and muco-purulent secretions (mucus and pus corpuscles), the same croupous exudates, and the same detachment of epithelium.

The different stages and degrees of inflammation are, of course, here, as everywhere, important modifying circumstances. In chronic uterine catarrh, as a rule, the secretion from the cavity of the uterus is more or less purulent; while from the cervix it is usually tough, coherent, and gelatinous. When the process continues for some time, the structure of the mucous membrane is more apt to become changed than in other localities. The ciliated epithelium is swept off, and, what is somewhat peculiar, when removed it is said to be replaced by

cells without cilia; thus interfering more or less with the normal function of the membrane. The same forms of ulcers also (*diffuse catarrhal*, and *follicular*) that occur in chronic inflammations of other mucous membranes are observed here.

Catarrh of the vagina, like that of the uterus, is also one of the most common of female diseases. It manifests itself by what is known as a leucorrhœal discharge (*fluor albus vaginalis*); and, according to *Kölliker*, *Scanzoni*, and others, the more opaque or yellow the secretion, the more numerous are its pavement epithelium and young cells. Direct local irritants, also, such as the discharge from a sloughing cancer, irritation from the use of a bad pessary, etc., have been known to give rise to croupous and diphtheritic inflammation of the vaginal mucous membrane, such as occurs in the mucous membrane of the respiratory track.

Catarrh of the kidneys is usually associated with the symptomatic phenomena of Bright's disease. We are indebted to Virchow for a wonderfully clear statement of the lesions of this disease in their associated relations to each other. His classification is made on a purely anatomical basis, and it tends greatly to simplify what has been rendered complex and unsatisfactory in the study of the disease.

He points out fundamental distinctions in three forms of albuminuria; and to comprehend them we must have reference to three anatomical elements of the kidney, viz., *tubules*, *interstitial connective tissue*, and *blood-vessels*. Now, either of these structures, as clearly pointed out by Virchow, may be respectively and primarily the seat of characteristic lesions; that is, we may have disease of the secreting channels, of the connective tissue, or of the blood-vessels.

The *first*, or tubal form, is a distinctly catarrhal and inflammatory affection of the mucous membrane of the uriniferous tubules. Dr. George Johnson describes this form of the disease under the name of "acute desquamative nephritis." It is, however, essentially a catarrhal process—a kind of bronchitis of the kidney, in which the microscope reveals "epithelial casts," epithelial cells, blood-corpuscles, and granular matter, such as croupous exudates, contained in every locality.

In the *second* form of the disease, the delicate net-work of

the interstitial connective tissue is the seat of disease. This is essentially a *chronic* form of kidney-disease, and is described by Virchow as "cirrhosis of the kidney," and by others as "granular degeneration."

The *third* form has its point of origin in the capillary blood-vessels of the kidney, and has been most frequently described as lardaceous, amyloid, or "waxy degeneration." It is with the acute catarrhal form, however, that we are principally interested at present. This is the most frequent form, and often the initial point of disease in the other varieties described.

Lastly, it is an interesting fact that these local lesions of mucous membranes are often secondary to general constitutional conditions. This opens up too wide a field of pathological research to enter at present. One or two points of interest, however, may be noted. One is that, under circumstances of mal-assimilation, there are often *morbid gases* generated in the organism, and these, like the more solid products of tissue metamorphoses, are freely eliminated from mucous membranes. Prof. Tiedman's experiments on *pulmonary exhalation* have thrown much light upon this subject, and have shown that the mucous membrane of the intestines, from the great activity which it is capable of displaying under certain states of vitiated circulation, is an excretory organ of much importance, and as such is perhaps generally underrated. Pathologists are also pointing out a very intimate connection between the assimilation of *albuminous* principles and the functions of mucous membranes—an unhealthy condition of one determining a corresponding change in the other. This is more strikingly exemplified in the *gouty* and *rheumatic* diatheses than in any other. The connection between the morbid tendencies of these affections and asthma, bronchitis, ophthalmia, renal disease, and many other affections the nature of which has not been well understood, is a remarkable pathological observation which is receiving much attention from investigators of morbid phenomena, both in Europe and America.

But it is not my purpose to write an exhaustive article on morbid states of mucous membranes. Nor do I claim to have written any thing new. I have rather sought to gen-

eralize knowledge already possessed, and to rearrange, in a more natural and suggestive order, if possible, simple elementary facts wrought out by others, hoping that, as presented, they may excite interest in, and possibly serve as a kind of key to, the study of new, and especially German, views of the pathology of mucous membranes.

That the subject is, of itself, full of interest may be inferred from the important anatomical and physiological relations of this structure in the animal economy. Its extent of surface is equalled only by the skin, and, like that structure, it "forms a defensive medium of communication between the individual being and the outer world."

When we take into consideration its great extent of surface, its importance as a channel for eliminating morbid matters from the blood, its direct influence over the important function of primary assimilation, and the frequency with which it is involved, directly or indirectly, in morbid action, it can scarcely seem like a strange fancy of a distinguished Fellow of the Royal College of London, who was in the habit of regarding his patients as so many "mucous membranes." On retiring from the profession, at a ripe old age, he remarked: "I have taken my last fee from my last mucous membrane."

Whether this be regarded as a fanciful exaggeration or not, certain it is that no structures of the body are so frequently involved in morbid action as mucous membranes; and for this reason, if for no other, their diseases should be studied with an interest and zeal pertaining to no other department of pathology.